

## **REMARKS**

In response to the Office Action mailed June 8, 2007, Applicants respectfully request reconsideration. Each of the issues raised in the Office Action is addressed herein.

Claims 1-45 and 47-125 were previously pending in this application. In this paper, claims 1, 2, 4-7, 12-18, 20, 23, 24, 28-31, 35-41, 43-47, 52, 53, 56-59, 61-68, 70, 75-79, 86, 87, 89-94, 100-102, 109, 114, 115, and 118-125 have been amended to more particularly define Applicants' contribution to the art and/or address certain informalities in these claims. Support for the amendments can be found throughout the specification and in these claims, as originally filed. Also, claims 46 and 126-132 have been added and claims 3, 8-11, 19, 21-22, 25-27, 32-34, 42, 48-51, 54-55, 60, 69, 71-74, 80-85, 88, 95-99, 103-108, 110-113, and 116-117 have been cancelled. As a result, claims 1, 2, 4-7, 12-18, 20, 23, 24, 28-31, 35-41, 43-47, 52, 53, 56-59, 61-68, 70, 75-79, 86, 87, 89-94, 100-102, 109, 114, 115, and 118-132 are pending for examination, with claims 1, 12, 23, 28, 31, 37, 39, 47, 56, 64, 75, 86, 91, 94, 100, 102, 109, 118, and 129 being independent claims. No new matter is added. The application as now presented is believed to be in allowable condition.

### **I. Allowable Subject Matter**

Applicants note with appreciation that claims 28, 31, 39, 91, 94, and 102 are deemed to recite allowable subject matter. While not acceding to the rejection of any base claim, each of these claims has been rewritten in independent form to include all of the limitations of its base claim and any intervening claims. Accordingly, these claims should now be in condition for allowance.

### **II. Claim Objections**

Claim 46 is objected to because it was missing in the previously submitted claim set. Applicant has added claim 46 herein as a new claim that depends from claim 37. Support for new claim 46 may be found in FIG. 46 of the application, and in the specification as filed on page 91, lines 13-15. Accordingly, the objection to the claims should be withdrawn.

### III. Discussion of Cited References

The independent claims of the present application stand rejected under either 35 U.S.C. §102 or 35 U.S.C. §103. The Office Action relies on two prior art references to support these rejections, namely, U.S. Patent No. 6,498,592 (“Matthies”) and U.S. Patent No. 6,999,045 (“Cok”). These references are discussed first below, followed by Applicants’ arguments in support of the patentability of all claims as now presented.

#### A. Matthies

Matthies discloses tiled display structures employing multiple relatively smaller tiles assembled together to form a large-area flat display (col. 1, lines 12 and 58-59; col. 2, lines 39-41). As shown in Matthies’ FIG. 1, a large-area display 100 includes multiple smaller tiles 120, 122, and 124, wherein each tile includes multiple pixel forming elements (col. 4, lines 10-16 and 31-44). Matthies discloses both monochrome and color displays; in a color display embodiment shown in Matthies’ FIGS. 6A and 6B, each pixel element includes separate red, green and blue sub-pixels (col. 16, lines 7-10).

Electronic circuitry for controlling each tile of Matthies’ multi-tile display is shown in FIG. 2. The electronic circuitry includes row select circuitry 222 to select pixels, and column drivers 220 to provide current to selected pixels to generate an appropriate brightness and color from the pixels (col. 9, lines 21-29; 65 – col. 10, line 4). Pursuant to a row/column addressing technique, one row of pixels is illuminated at a time (col. 9, lines 38-40); in particular, the row select circuitry 222 includes a shift register that clocks through and applies a logic-high value to successive rows of a tile. As the logic-high value is applied to each row, all of the pixels in that row are selected (col. 9, lines 60-64). Timing and sequence logic 210 controls the row select circuitry 222 to facilitate row selection, fetches from memory 212 a line of data corresponding to a selected row, and applies selected data to a pulse width modulator (PWM) 218 (col. 10, lines 19-22). The PWM 218 converts the data into pulse widths that control the column drivers 220 to apply current levels provided by a programmable current source 216 to respective columns of the selected row, thereby causing all of the pixels of the row to generate light. (col. 10, lines 24-28).

In Matthies, the foregoing row/column selection technique for pixels is employed similarly for color displays involving red, green and blue sub-pixels. For example, in FIG. 6A, one row electrode is used by all three sub-pixels, but each sub-pixel has its own column

electrode (col. 16, lines. 10-19). Alternatively, in FIG. 6B, the sub-pixels 830, 832, 834, and 836 are disposed in a quad sub-pixel structure, in which two row electrodes and two column electrodes are used to illuminate the sub-pixels (col. 16, line 37-43 and 56-58).

It is particularly noteworthy that nowhere in the reference does Matthies disclose or suggest the use of any serial addressing technique or protocol to select or generate light from pixels or sub-pixels of a tile. Rather, as discussed above, the teachings of Matthies are limited to a conventional row/column addressing technique, in which all pixels of a given row are selected at the same time, each row receives only data for that row, and each pixel (or sub-pixel) in the row is energized by a particular corresponding current value for that pixel (or sub-pixel) based on the row data.

In another aspect, Matthies discusses the issue of heat dissipation in flat panel displays based on multiple tiles. For example, FIGS. 14, 15, and 16 illustrate video tiles configured to improve heat dissipation (col. 21, line 30 *et seq.*). In FIG. 16, multiple pixels 2103 are mounted on a single substrate 2101, and a flexible circuit board 2301 is connected to the back of the substrate 2101 (col. 22, lines 12-18). Circuit board electronics 2104 are positioned at an end of the flexible circuit board 2301 that is bent away from the substrate 2101 on which the pixels are mounted, so as to alleviate “hot spots” on the substrate (col. 22, lines. 18-22). The flexible circuit board, however, does not contain the pixels 2103, but rather only the circuit board electronics 2104; stated differently, no light generating elements are themselves implemented on Matthies’ flexible circuit board.

#### B. Cok

Similarly to Matthies, Cok discloses a display formed by multiple tiles. As shown in Cok’s FIG. 1, a display 8 includes tiles 10 connected in series through communication channels 11 and controlled by a display controller 12 (col. 2, lines 51-58). The display controller 12 controls the tiles, based on data representing an image source (image data source 14), such that each tile 10 displays a portion 22 of an overall image 20 (FIG. 3; col. 2, lines 61-64). As shown in Cok’s FIG. 4, each tile 10 includes an array 30 of display pixels to generate the prescribed portion of the overall image (col. 3, lines 10-11).

In Cok, the image source data received by the display controller 12 is formatted by the controller into a serial data stream, in which rows of the image are sequentially ordered and,

within a given row, image pixels are sequentially ordered (col. 3, ll. 28-31). Data for the full image is transmitted by the display controller 12 to a first tile in the series, which stores in a local memory a first portion of the image data, and then passes the remainder of the image data to the next tile in the series (col. 2, line 65 through col. 3, line 7). A similar process is repeated for each remaining tile in succession (col. 3, lines 31-37).

As shown in Cok's FIG. 4, each tile 10 includes a tile controller 32 that employs conventional digital logic to determine what portion of the image data to store in local tile memory 36 and ultimately display on its array of display pixels 30 (col. 3, lines 22-26). Specifically, the tile controller is programmed to compute the portion of the image to store locally, and then take appropriate actions with regard to enlargement, reduction, and cropping depending on the size of the image and the overall display size and configuration (col. 3, lines 38-42; col. 4, lines 7-29). It is particularly noteworthy, however, that Cok does not disclose any details whatsoever as to how the tile controller 32 of each tile specifically controls the array of display pixels 30 in each tile to generate light; in fact, Cok is completely silent in this regard.

Accordingly, at best, Cok merely discloses that a display may comprise multiple tiles connected in series, wherein a display controller communicates image data to the multiple tiles based on a serial data stream (in which row-by-row pixel information corresponding to an image is sequentially ordered). A tile controller in each tile is programmed to store that tile's portion of the overall image data in its own local memory, and control an array of pixels in the tile based on the stored data. However, Cok fails to describe specifically *how* the array of pixels in each tile is controlled by the tile controller – rather, Cok only discloses some general information as to how the tile controller selects incoming data for storage in the tile's local memory.

#### IV. Rejections Under 35 U.S.C. §102

##### A. Rejections based on Matthies

Claims 1, 3-4, 6, 12, 14-15, 23, 25-26, 29-30, 64, 66-67, 69, 75 and 86 (including independent claims 1, 12, 23, 64, 75 and 86) stand rejected under 35 U.S.C. §102(e) as being anticipated by Matthies. Applicants respectfully traverse these rejections to the extent they are maintained over the claims as now presented.

1. Independent Claims 1 and 64

Claim 1, as amended, recites a tile lighting system comprising, *inter alia*, a plurality of addressable lighting units configured in a flexible string and arranged in a grid. The feature of “lighting units configured in a flexible string” similarly appears in independent claim 37 as originally filed. Support for this feature also can be found in Applicants’ specification on page 99, line 12 and in FIG. 68.

Matthies fails to disclose a tile lighting system comprising a **plurality of addressable lighting units configured in a flexible string and arranged in a grid**. The Office Action notes on page 7, paragraph 7 that Matthies discloses a “flexible board” 2301 in Matthies’ FIG. 16. However, the Office Action fails to point to any disclosure or suggestion in Matthies of a flexible *string*. Furthermore, as discussed above in section (III)(A), there are no pixels of light-generating elements implemented in the flexible circuit board of Matthies; rather, this flexible circuit board merely contains electronics 2104.

Accordingly, Matthies fails to disclose or suggest a plurality of addressable lighting units configured in a flexible string and arranged in a grid, as recited in claim 1. For at least the foregoing reasons, claim 1 patentably distinguishes over Matthies and is in condition for allowance. Therefore, the rejection of claim 1 under 35 U.S.C. §102(e) should be withdrawn. Claims 2 and 4-7 depend from claim 1 and are patentable based at least upon their dependency

Claim 64, as amended, is a method claim that closely tracks the language of claim 1. Thus, for reasons similar to those discussed above in connection with claim 1, claim 64 patentably distinguishes over Matthies and is in condition for allowance. Claims 65-68, and 70 depend from claim 64 and are patentable based at least upon their dependency.

2. Independent Claims 12 and 75

Claim 12, as amended, recites a tile lighting system comprising a plurality of addressable LED lighting units disposed on a circuit board in an array. The addressable LED lighting units respond to control signals provided using a **serial addressing protocol** to produce mixed light of varying colors, **wherein at least one of the addressable lighting units receives data intended for at least two lighting units of the plurality of addressable lighting units and selectively responds to data addressed to it**. Support for the amendments to claim 12 can be found in the specification as filed at least in the passages on page 12, line 38 through page 13, line 25.

Matthies fails to disclose or suggest the tile lighting system of claim 12. As discussed above in section (III)(A), Matthies discloses tiles including pixels that are illuminated by a row/column addressing technique. By contrast, claim 12 recites that addressable LED lighting units respond to control signals provided using a serial addressing protocol. Claim 12 further recites that at least one of the addressable lighting units receives data intended for at least two lighting units of the plurality of addressable lighting units and selectively responds to data addressed to it. Nowhere in the reference does Matthies disclose or suggest any such concept.

For at least the foregoing reasons, claim 12 patentably distinguishes over Matthies and is in condition for allowance. Therefore, the rejection of claim 12 under 35 U.S.C. §102(e) should be withdrawn. Claims 13-18, and 20 depend from claim 12 and are patentable for at least the same reasons.

Claim 75, as amended, is a method claim that closely tracks the language of claim 12. Thus, for at least the reasons discussed above, claim 75 similarly distinguishes over Matthies and is in condition for allowance. Claims 76-85 depend from claim 75 and are patentable based at least upon their dependency.

For completeness, Applicants also submit that claims 12 and 75 patentably distinguish over Cok. As discussed above in section (III)(B), Cok discloses display tiles 10 that include an array of pixels. While Cok discusses various aspects of data communication and processing in a display tile, Cok does not discuss however any details regarding generating light from the array of pixels in each tile. More specifically, Cok does not disclose that the respective tiles of the disclosed display each include a plurality of addressable LED lighting units disposed on a circuit board in an array, wherein at least one of the addressable lighting units receives data intended for at least two lighting units of the plurality of addressable lighting units and selectively responds to data addressed to it. Rather, Cok only discloses serial communication *between* the tiles, and is completely silent as to the operation of pixels *within* each tile. In contrast, claims 12 and 75 recite a tile lighting system that comprises a plurality of addressable LED lighting units, wherein at least one of the addressable lighting units receives data intended for at least two lighting units of the plurality of addressable lighting units and selectively responds to data addressed to it. In view of the foregoing, claims 12 and 75 patentably distinguish over Cok as well as Matthies.

Furthermore, if each of Cok's tiles 10 was itself read as one of "a plurality of addressable LED lighting units," Cok would still fail to anticipate or render obvious claims 12 and 75.

Again, claims 12 and 75 require that a plurality of LED lighting units are **disposed on a circuit board in an array**. In contrast, Cok's tiles 10 are mounted on a support 70 by mounting brackets 72, as shown in Cok's Fig. 7, with the display controller 12 also mounted to the support 70 (col. 5, lines 44-51). While Fig. 7 shows that the components of each tile are mounted on a circuit board 62 dedicated to each tile, the multiple tiles 10 themselves clearly are not disposed on a circuit board; rather, as indicated above, the tiles are mounted to the support 70. Accordingly, for this additional reason, claims 12 and 75 patentably distinguish over both Cok and Matthies.

### 3. Independent Claims 23 and 86

Claim 23, as amended, recites a tile light comprising, *inter alia*, a plurality of LED lighting units disposed only about a perimeter of a substantially rectangular housing. Support for the amendments to claim 23 can be found in the application as filed, for example in FIG. 15.

Matthies fails to disclose or suggest the tile light of claim 23, wherein a plurality of LED lighting units is disposed **only about a perimeter** of a substantially rectangular housing. Clearly, Matthies' display includes a complete two dimensional array of pixels to reproduce a desired image; anything short of this would render Matthies' device unsuitable for its intended purpose. For at least this reason, claim 23 patentably distinguishes over Matthies and is in condition for allowance. Therefore, the rejection of claim 23 under 35 U.S.C. §102(e) should be withdrawn. Claims 24, 29, 30, 35, and 36 depend from claim 23 and are allowable based at least upon their dependency.

Claim 86, as amended, is a method claim that closely tracks the language of claim 23. Thus, for at least the reasons discussed above, claim 86 similarly distinguishes over Matthies and is in condition for allowance. Claims 87, 89, 90, 92, and 93 depend from claim 86 and are allowable based at least upon their dependency.

### B. Rejections based on Cok

Claims 47-51, 56-61, 109-113, and 118-122 (including independent claims 47, 56, 109 and 118) stand rejected under 35 U.S.C. §102(e) as being anticipated by Cok. Applicants respectfully traverse these rejections to the extent they are maintained over the claims as now presented.

1. Claims 47 and 109

Claim 47, as amended, recites limitations similar to those found in claims 12 and 75, discussed above. In particular, claim 47 recites a modular component for a lighting system, comprising a plurality of addressable LED-based lighting units disposed in an array on a circuit board. Each addressable lighting unit of the plurality of addressable lighting units is **configured to respond to data addressed to it in a serial addressing protocol, by receiving data intended for at least two lighting units of the plurality of addressable lighting units and selectively responding to data addressed to it**. Support for the amendments to claim 47 can be found in the specification as filed at least in the passages on page 12, line 38 through page 13, line 25.

As discussed above in connection with claim 12, Cok does not disclose that respective tiles of the disclosed display each include a plurality of addressable LED lighting units disposed in an array on a circuit board, wherein each addressable lighting unit responds to data addressed to it in a serial addressing protocol by receiving data intended for at least two lighting units of the plurality of addressable lighting units and selectively responding to data addressed to it. Rather, Cok only discloses serial communication *between* the tiles, and is completely silent as to the operation of pixels *within* each tile. Furthermore, if each of Cok's tiles was itself read as one of "a plurality of addressable LED lighting units," Cok would still fail to anticipate or render obvious claims 12 and 75, as Cok's tiles clearly are not **disposed in an array on a circuit board**. Accordingly, claim 47 patentably distinguishes over Cok and is in condition for allowance. Claims 52 and 53 depend from claim 47 and are patentable based at least upon their dependency.

Claim 109, as amended, is a method claim that closely tracks the language of claim 47. Thus, for at least the reasons discussed above, claim 109 similarly distinguishes over Cok and is in condition for allowance. Claims 114 and 115 depend from claim 109 and are allowable based at least upon their dependency.

2. Claims 56 and 118

Claims 56 and 118 recite limitations substantially similar to those recited in claims 47 and 109, discussed immediately above. For example, claim 56, as amended, recites a lighting



system comprising a plurality of modular components, wherein each modular component includes a plurality of addressable LED-based lighting units disposed in an array on a circuit board, wherein each addressable lighting unit is configured to respond to data addressed to it in a serial addressing protocol, by receiving data intended for at least two lighting units of the plurality of addressable lighting units and selectively responding to data addressed to it. Claim 118 is a method claim that closely tracks the language of claim 56. For reasons similar to those discussed above in connection with claims 47 and 109, claims 56 and 118 are believed to patentably distinguish over Cok and are therefore in condition for allowance. Claims 57-59, 61-63 and 119-122 depend from one of claims 56 and 118 and are allowable based at least upon their dependency.

V. Rejections Under 35 U.S.C. §103

Claims 37-38, 40-43, 52-53, 100-101, 103-106, and 114-115 (including independent claims 37 and 100) stand rejected under 35 U.S.C. §103(a) as purportedly being obvious over Cok in view of Matthies. Applicants respectfully traverse these rejections.

Claim 37 recites a lighting system comprising, *inter alia*, a series of LED-based addressable lighting units for producing mixed light of varying colors, wherein each lighting unit is configured to respond to data addressed to it in a serial addressing protocol. The series of lighting units is **configured in a flexible string**.

As set forth in MPEP §2143, three criteria must be met in order to establish a *prima facie* case of obviousness. One of these three criteria is that the prior art reference(s), when viewed as a whole, must teach or suggest all of the claimed features. Failure to meet this criterion – a teaching or suggestion of **all** claim elements – is sufficient to render an obviousness rejection improper.

The Office Action fails to establish a *prima facie* case of obviousness in connection with claim 37, as neither Cok nor Matthies discloses or suggests a series of lighting units configured in a flexible string. As discussed above in section (IV)(A)(1) in connection claim 1, the Office Action notes the flexible circuit board illustrated in FIG. 16 of Matthies, but fails to indicate how this flexible circuit board purportedly teaches or suggests a flexible *string*. Moreover, Matthies' flexible circuit board merely includes various electronics, and does not include any light-generating pixels or elements. Cok fails to cure the deficiency of Matthies in this respect;

nowhere in the reference does Cok even remotely disclose or suggest anything related to flexible circuit board or a flexible string.

Accordingly, both Cok and Matthies fail to disclose or suggest a series of lighting units configured in a flexible string, as recited in claim 37. For at least this reason, claim 37 patentably distinguishes over the combination of Cok and Matthies and is in condition for allowance. Therefore, the rejection of claim 37 under 35 U.S.C. §103 should be withdrawn. Claims 38, 40, 41, and 43-46 depend from claim 37 and are patentable based at least upon their dependency.

Claim 100 is a method claim that closely tracks the language of claim 37. Thus, for at least the reasons discussed above, claim 100 similarly distinguishes over the combination of Cok and Matthies and is in condition for allowance. Claim 101 depends from claim 100 and is patentable based at least upon its dependency.

#### VI. General Comments on Dependent Claims

Since each of the dependent claims depends from a base claim that is believed to be in condition for allowance, Applicants believe that it is unnecessary at this time to further argue the allowability of each of the dependent claims individually. However, Applicants do not necessarily concur with the interpretation of any dependent claims as set forth in the Office Action, nor do Applicants concur that the basis for the rejection of any of the dependent claims is proper. Therefore, Applicants reserve the right to specifically address the patentability of the dependent claims in the future, if deemed necessary.

#### VII. New Claims

Applicant has added new claims 126-132 to further define Applicants' contribution to the art. Support for the new claims can be found in the application and claims as originally filed, and no new matter has been added.

Applicant believes that new claims 126-132 are in condition for allowance, and respectfully requests a notice to this effect. Claims 126 and 127 depend from independent claim 1, and are patentable based at least upon their dependency. Claim 128 depends indirectly from independent claim 56 and is patentable based at least upon its dependency. Claim 130 depends from independent claim 64 and is patentable based at least upon its dependency. Claims 131 and

132 depend directly or indirectly from independent claim 75 and are patentable based at least upon their dependency.

Claim 129 is an independent claim and is patentable because the art of record fails to teach or suggest all the limitations of the claim. For example, claim 129 recites a method for providing illumination, comprising, *inter alia*, arranging a first flexible string of addressable lighting units in a first grid, and arranging a second flexible string of addressable lighting units in a second grid. The art of record fails to teach at least this limitation of the claim, and accordingly claim 129 is patentable.

### **CONCLUSION**

It is respectfully believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment set forth in the Office Action does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Furthermore, nothing in this paper should be construed as an intent to concede any issue with regard to any claim.

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' representative at the telephone number indicated below to discuss any outstanding issues relating to the allowability of the application.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,  
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